UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/613,797	07/02/2003	Isaac Farr	10017176-1	7355

22879 7590 06/06/2005

HEWLETT PACKARD COMPANY
P O BOX 272400, 3404 E. HARMONY ROAD
INTELLECTUAL PROPERTY ADMINISTRATION
FORT COLLINS, CO 80527-2400

EXAMINER	
LIANG, LEONARD S	

ART UNIT	PAPER NUMBER
2853	

DATE MAILED: 06/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/613,797	FARR ET AL.	
	Examiner	Art Unit	
	Leonard S. Liang	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-68* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,9-22,24-36,38,39,41-44,46-59 and 61-68* is/are rejected.

7)☒ Claim(s) *7,8,23,37,40,45 and 60* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 July 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *07/02/03, 12/13/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

The applicant's arguments with respect to the response to election/restriction filed on 03/15/05 are considered persuasive. The previous election requirement is hereby withdrawn and claims 1-68 will be examined as shown in the below rejection.

Specification and Drawings

The disclosure is objected to because of the following informalities:

- On page 2, line 26, there is a grammar error. The language should be worded "configured **to** receive data"
- On page 5, line 21 - reference 54 seems to point to a capacitor and not a resistor
- On page 5, line 25 - figure 4, reference 42 points to a resistor and not printing fluid
- On page 7, line 13, figure 2 has no reference of first contact 70 and second contact 72
- On page 15, lines 4 and 19, voltage source 402 is not in figure, nor is ammeter 410 in the figure

Appropriate correction is required.

Claim Objections

Claim 6 is objected to because of the following informalities: Claim 6 is dependent on claim 6. It will be construed that the claim should depend on claim5 instead. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

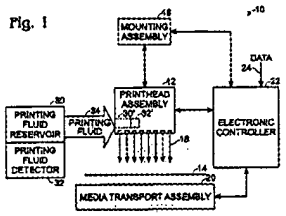
Claims 1-6, 9-22, 24-36, 38-39, 41-44, 46-59, and 61-68 are rejected under 35 U.S.C. 102(e) as being anticipated by Farr et al (US PgPub 20040223021)

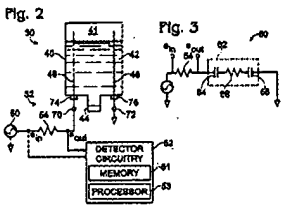
The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Farr et al discloses:

- {claim 1} A printing device (figure 1); a printing fluid reservoir configured to hold a volume of a printing fluid (figure 1, reference 30); a print head assembly configured to transfer the printing fluid to a printing medium (figure 1, reference

12); a conduit fluidically connecting the printing fluid reservoir and the print head assembly (figure 1, reference 34); and a printing fluid detector including a first electrode and a second electrode configured to detect an impedance characteristic of the printing fluid (figure 1, reference 32; figure 2, reference 46, 48; paragraph 0023); wherein the printing fluid detector is configured to distinguish printing fluid from printing fluid froth by taking an impedance measurement across the first electrode and the second electrode and then comparing the impedance measurement to a froth threshold impedance value that is calibrated to a measured printing fluid temperature (paragraph 0023, 0053-0056)





- {claim 2} wherein the printing fluid detector is configured to calibrate the froth threshold impedance value to a measured printing fluid temperature (paragraph 0055)
- {claim 3} wherein the printing fluid detector is configured to recalibrate the froth threshold value on a periodic basis (paragraph 0055)
- {claim 4} wherein the printing fluid detector is configured to recalibrate the froth threshold impedance value by determining a measured printing fluid temperature,

and the comparing the measured printing fluid temperature to a plurality or predetermined printing fluid temperatures correlated with specific froth impedance threshold values to determine the froth impedance threshold value corresponding to the measured printing fluid temperature (paragraph 0055)

- {claim 5} wherein the printing fluid detector is configured to determine the measured printing fluid temperature by taking a plurality of impedance measurements across the first electrode and the second electrode, calculating a measured statistical deviation of the plurality of impedance measurements, and if the measured statistical deviation isles than or equal to a predetermined statistical deviation threshold, the comparing at least one of the impedance measurements to a plurality of predetermined printing fluid impedance values correlated with specific printing fluid temperatures to determine the measured printing fluid temperature (paragraph 0055)
- {claim 6} wherein the statistical deviation is a standard deviation (paragraph 0055)
- {claim 9} a power supply configured to produce an alternating signal and to apply the alternating signal to the first electrode and the second electrode (paragraph 0057)
- {claim 10} wherein the impedance measurement is a resistance measurement, and wherein the power supply is configured to supply a signal with a frequency of between approximately 1 kHz and 100 kHz (paragraph 0051-0052)

- {claims 11 and 26} wherein the alternating signal is unipolar, further comprising a bipolar conversion circuit configured to form a bipolar alternating signal using the uniolar alternating signal, and to provide the bipolar alternating signal to the first electrode and the second electrode (figure 13-14; paragraph 0057-0062)
- {claims 12 and 27} wherein the power supply is a first power supply and is connected to the first electrode, and wherein the bipolar conversion circuit includes a second power supply connected to the second electrode and configured to output a unipolar alternating signal to the second electrode (figure 13-14; paragraph 0057-0062)
- {claims 13 and 28} wherein the unipolar alternating signal output by the first power supply is approximately 180 degrees out of phase with the unipolar alternating signal output by the second power supply (paragraph 0062)
- {claim 14} wherein the bipolar conversion circuit includes a capacitor disposed between ground and the second electrode, and wherein the capacitor is configured to be charged by the power supply and to maintain the second electrode at a potential between ground and a maximum output voltage of the power supply (figure 13-14; paragraph 0057-0062)

Fig. 13

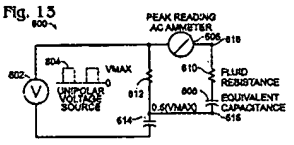
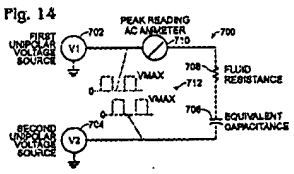


Fig. 14



- {claims 15 and 30} wherein the bipolar conversion circuit includes a resistor in series with the capacitor, and wherein a resistance of the resistor is selected in combination with the capacitor to give an RC time constant larger than a period of the alternating signal (figure 13-14; paragraph 0057-0062)
- {claims 16 and 31} wherein the capacitor is configured to hold the second electrode at a potential approximately one half of the maximum output voltage of the power supply (figure 13-14; paragraph 0057-0062)
- {claim 17} wherein the electrodes are configured to be in direct contact with the printing fluid (figure 2, reference 46, 48; paragraph 0028)
- {claim 18} wherein the electrodes are disposed at least partially within the conduit (figure 2, reference 46, 48}
- {claim 19} wherein the electrodes are disposed at least partially within the printing fluid reservoir (figure 2, reference 46, 48}
- {claim 20} wherein the printing device is a printer (paragraph 0001-0003)
- {claim 21} A printing device (figure 1); a printing fluid reservoir configured to hold a volume of a printing fluid (figure 1, reference 30); a print head assembly configured to transfer the printing fluid to a printing medium (figure 1, reference 12); a conduit fluidically connecting the printing fluid reservoir to the print head assembly (figure 1, reference 34); and a printing fluid detector having a first electrode and a second electrode configured to be in contact with the printing fluid (figure 2, reference 46, 48; paragraph 0028); wherein the printing fluid detector is configured to take a plurality of impedance measurements across the

first electrode and the second electrode, to compute a calculated statistical deviation of the plurality of impedance measurements, and to compare the calculated statistical deviation to a predetermined statistical deviation threshold to determine whether the conduit contains printing fluid froth (paragraph 0055)

- {claim 22} wherein the calculated statistical deviation and the predetermined statistical deviation are standard deviations (paragraph 0055)
- {claim 24} a power supply configured to output an alternating signal and to apply the alternating signal across the electrodes (paragraph 0057)
- {claim 25} wherein the alternating signal has a frequency of between approximately 1 kHz and 100 kHz (paragraph 0051-0052)
- {claim 29} wherein the bipolar conversion circuit includes a capacitor disposed between ground and the second electrode, and wherein the capacitor is configured to be charged by the power supply and to hold the second electrode at a potential between a minimum output voltage and a maximum output voltage at the power supply (figure 13-14; paragraph 0057-0062)
- {claim 32} wherein the printing fluid detector includes detector circuitry having a processor operatively linked to a memory containing a set of instructions executable by the processor to compare at least one of the plurality of impedance measurements to a plurality of predetermined impedance values stored in the memory and correlated with specific printing fluid temperatures to determine a measured printing fluid temperature (paragraph 0027)

- {claim 33} wherein the set of instructions are executable by the processor to determine the measured printing fluid temperature if the measured statistical deviation is lower than the predetermined statistical deviation threshold (paragraph 0027, 0055)
- {claim 34} wherein the set of instructions are executable by the processor to compare the measured printing fluid temperature to a plurality of predetermined printing fluid temperature that are correlated with specific printing fluid froth impedances to determine a calibrated froth threshold impedance (paragraph 0027, 0055)
- {claim 35} wherein the set of instructions are executable by the processor to periodically redetermine the measured printing fluid temperature and the calibrated froth threshold impedance value (paragraph 0027, 0055)
- {claim 36} wherein the set of instructions are executable by the processor to take a new printing fluid impedance measurement after determining the calibrated froth threshold impedance value, and to compare the new printing fluid impedance measurement to the calibrated froth threshold impedance value to determine if the conduit contains printing froth fluid (paragraph 0027, 0055)
- {claim 38} In a printing device having a printing fluid detector that includes a first electrode and a second electrode configured to be in contact with the printing fluid, a method of determining the presence of printing fluid froth between the first electrode and the second electrode, the method comprising: taking a plurality of impedance measurements across the first electrode and the second electrode;

determining a measured statistical deviation of the plurality of impedance measurements; and comparing the measured statistical deviation of the plurality of impedance measurements to a predetermined statistical deviation threshold (paragraph 0023; 0053-0056)

- {claim 39} wherein the measured statistical deviation and the predetermined statistical deviation threshold are standard deviations (paragraph 0055)
- {claim 41} wherein printing fluid froth is determined to exist between the first electrode and the second electrode if the measured statistical deviation is above the predetermined statistical deviation threshold (paragraph 0055)
- {claim 42} wherein printing fluid is determined to exist between the first electrode and the second electrode if the measured statistical deviation is below the predetermined statistical deviation threshold (paragraph 0055)
- {claim 43} determining a calibrated froth impedance value if the measured statistical deviation is below a predetermined statistical deviation (paragraph 0055)
- {claim 44} wherein determining a calibrated froth threshold impedance value includes comparing at least one of the impedance measurements to a plurality of predetermined impedance values correlated to specific printing fluid temperatures to determine a measured printing fluid temperature (paragraph 0055)
- {claim 46} determining a calibrated froth threshold impedance value by comparing the measured printing fluid temperature to a plurality of predetermined printing fluid temperatures correlated to specific froth impedance threshold values

to determine the specific froth impedance threshold value corresponding to the measured printing fluid temperature (paragraph 0053-0056)

- {claim 47} taking a new impedance measurement after determining the calibrated froth threshold impedance value, comparing the new impedance measurement to the calibrated froth threshold impedance value, and determining that printing fluid froth exists between the first electrode and second electrode if the new impedance measurement exceeds the calibrated froth threshold impedance value (paragraph 0053-0056)
- {claim 48} wherein the calibrated printing fluid froth threshold value is updated periodically (paragraph 0056)
- {claim 49} applying an alternating signal to the first electrode and the second electrode (paragraph 0057)
- {claim 50} wherein the alternating signal has a frequency of between approximately 1 kHz and 100 kHz (paragraph 0051-0052)
- {claim 51} wherein the alternating signal is unipolar, further comprising forming a bipolar alternating signal using the unipolar alternating signal, and applying the bipolar alternating signal to the first electrode and the second electrode (figure 13-14; paragraph 0057-0062)
- {claim 52} wherein the unipolar alternating signal is a first signal, and wherein forming a bipolar alternating signa includes applying the first signal to the first electrode and applying a second bipolar alternating signal that is approximately

180 degrees out of phase with the first bipolar alternating signal to the second electrode (figure 13-14; paragraph 0057-0062)

- {claim 53} wherein forming a bipolar alternating signal includes applying the unipolar alternating signal to the first electrode while maintaining the second electrode at a potential between a minimum voltage and a maximum voltage of the unipolar alternating signal (figure 13-14; paragraph 0057-0062)
- {claim 54} wherein the second electrode is maintained at a potential between a minimum voltage and a maximum voltage by a capacitor in electrical communication with the second electrode (figure 13-14; paragraph 0057-0062)
- {claim 55} wherein the printing device is a printer (paragraph 0001-0003)
- {claim 56} wherein the electrodes are disposed at least partially within a conduit configured to transport printing fluid from a printing fluid reservoir to a print head assembly (figure 2, reference 46, 48)
- {claim 57} In a printing device having a printing fluid detector configured to determine a presence of printing fluid froth in a printing fluid delivery system, wherein the printing fluid detector includes a first electrode and a second electrode configured to be in contact with the printing fluid, a method of distinguishing printing fluid form printing fluid froth; taking an impedance measurement across the first electrode and the second electrode; comparing the impedance measurement to a froth threshold impedance value that is calibrated to a measured printing fluid temperature; and if the impedance measurement has a preselected relationship to the froth threshold impedance value, then determining

that at least some froth exists between the first electrode and the second electrode (figure 1-2; paragraph 0023; 0053-0056)

- {claim 58} wherein at least some froth is determined to exist between the first electrode and the second electrode if the impedance measurement exceeds the froth threshold impedance value (paragraph 0055)
- {claim 59} calibrating the froth threshold impedance value before taking the impedance measurement across the first electrode and the second electrode (paragraph 0053-0057)
- {claim 61} calibrating the froth threshold impedance value includes comparing the measured printing fluid temperature with a plurality of predetermined printing fluid temperatures correlated with specific froth threshold impedance value to determine the froth threshold impedance values corresponding to the measured printing fluid temperature (paragraph 0055)
- {claim 62} A printing device (figure 1); a printing fluid reservoir configured to hold a volume of printing fluid (figure 1, reference 30); a print head assembly configured to transfer the printing fluid onto a printing medium (figure 1, reference 12); a conduit configured to transport the printing fluid from the printing fluid reservoir to the print head assembly (figure 1, reference 34); a printing fluid detector configured to detect a presence or absence of printing fluid in at least one if the printing fluid reservoir, the conduit and the print head assembly, wherein the printing fluid detector includes a first electrode, a second electrode, and a power supply configured to output a unipolar alternating signal,

and wherein the printing fluid detector also includes a bipolar conversion circuit configured to form a bipolar alternating signal using the unipolar alternating signal and to provide the bipolar alternating signal to the first electrode and the second electrode (figure 1-2; 13-14; paragraph 0057-0062)

- {claim 63} wherein the impedance measurement is a resistance measurement, and wherein the power supply is configured to supply a signal with a frequency of between approximately 1 kHz and 100 kHz (figure 13-14; paragraph 0057-0062)
- {claim 64} wherein the power supply is a first power supply and is connected to the first electrode, and wherein the bipolar conversion circuit includes a second power supply connected to the second electrode and configured to output a unipolar alternating signal to the second electrode (figure 13-14; paragraph 0057-0062)
- {claim 65} wherein the unipolar alternating signal output by the first power supply is approximately 180 degrees out of phase with the unipolar alternating signal output by the second power supply (figure 13-14; paragraph 0057-0062)
- {claim 66} wherein the bipolar conversion circuit includes a capacitor disposed between ground and the second electrode, and wherein the capacitor is configured to be charged by the power supply and to hold the second electrode at a potential between ground and a maximum output voltage of the power supply (figure 13-14; paragraph 0057-0062)
- {claim 67} wherein the bipolar conversion circuit includes a resistor inseries with the capacitor, and wherein a resistance of the resistor is selected in combination

with the capacitor to give an RC time constant larger than the period of the alternating signal (figure 13-14; paragraph 0057-0062)

- {claim 68} wherein the capacitor is configured to hold the second electrode at a potential approximately one half of the maximum output voltage of the poer supply (figure 13-14; paragraph 0057-0062)

Allowable Subject Matter

Claims 7-8, 23, 37, 40, 45, and 60 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 7, 23, and 40 disclose "wherein the predetermined statistical deviation threshold is a standard deviation of approximately 3-10%," which was not found, taught, or disclosed in the prior arts.

Claims 8, 37, and 45 disclose "wherein the printing fluid detector is configured to compare an average of the plurality of impedance measurements to the plurality of predetermined printing fluid impedance values," which was not found, taught, or disclosed in the prior arts.

Claim 60 discloses "wherein calibrating the froth threshold impedance value includes taking a plurality of impedance measurements across the first electrode and the second electrode, determining a measured standard deviation of the plurality of impedance measurements, and if the measured standard deviation is less than a preselected standard deviation threshold, then comparing an average of the plurality of impedance measurements to a plurality of

predetermines impedance measurements correlated with specific printing fluid temperatures to determine the specific printing fluid temperature corresponding to the average of the impedance measurements," which was not found, taught, or disclosed in the prior arts.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Farr (US PgPub 20050024396) discloses a printing device having a printing fluid detector.

Farr et al (US Pat 6874861) discloses a printing device having a printing fluid detection system.

Farr et al (US Pat 6685290) discloses a printer consumable having data storage for static and dynamic calibration data and methods.

Wimmer et al (US Pat 5689288) discloses an ink level sensor.

Stephany et al (US Pat 5682184) discloses a system for sensing ink level and type of ink for an ink jet printer.

Endo et al (US Pat 6474156) discloses a method and device for determining the amount of a liquid existing in a container.

Monclus et al (US Pat 6402277) discloses an ink leak detection system in inkjet printing devices.

Lin et al (US Pat 6322182) discloses a method and apparatus of identifying ink stored in an ink-jet cartridge.

Stapleton (US Pat 5596351) discloses ink level sensing on a pen carriage in a pen plotter.

Stamer et al (US Pat 5583544) discloses a liquid level sensor for ink jet printers.

Koizumi et al (US Pat 5329304) discloses a remaining ink detecting device and ink jet head cartridge.

Yaji (US Pat 6084605) discloses an ink jet printer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard S. Liang whose telephone number is (571) 272-2148. The examiner can normally be reached on 8:30-5 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

05/25/05
lsl LSL

5/27/05
MANISH S. SHAH
PRIMARY EXAMINER

05/24/05 Claim Tree for 10613797